

SOME OBSERVATIONS ON SOME PHYSICO-CHEMICAL FEATURES OF TWO SIDE BRANCHES OF THE SHATT- AL-ARAB RIVER

NADIR A. SALMAN

Department of Fisheries, College of Agriculture

ABDUL KHALIQ A. A .FARIS

Natural History Museum, University of Basrah,
Basrah, Iraq

Limited limnological works have been done on the Shatt-Al-Arab river and its branches. Some hydrographical characteristics of the Shatt-Al-Arab and its adjacent areas were reported by Arndt and Al-Saadi (1975). Mohammad (1965) published his preliminary observations on some environmental conditions of the Shatt-Al-Arab based on a short term data. Keel and Saad (1975) studied the phytoplankton and some environmental parameters of the Shatt-Al-Arab. But our knowledge of the environmental factors of the side branches of the Shatt-Al-Arab is still scarce. The present paper, therefore, deals with the physico-chemical features of the two side branches (Sarraj and Mehejran) of the Shatt-Al-Arab river. Such ecological investigations on aquatic habitats are needed for solving agricultural and fisheries problems. Further these water bodies harbour numerous fauna and flora which are influenced by the physico-chemical conditions of these habitats.

STUDY AREA

The Sarraj and Mehejran are two side branches of the Shatt-Al-Arab. The width of the Sarraj at the upper portion is 23m, and at the lower portion 12m. It has a mean depth of

approximately 2m, maximum depth being 3.25m at the middle portion, minimum 0.8m at the lower portion.

Mehejran canal has a mean width of 12m with a maximum depth of 3.4m and a minimum of 2.05m. Depths of both canals vary with the tide action of the Shatt-Al-Arab.

In both canals huge amounts of submerged plants are found. Vegetations and trees grow on both banks. And there are also some influences from drainage and populated areas on both sides.

MATERIALS AND METHODS

Collection of data presented herein were made on monthly basis between January and August 1977. Three different stations were selected in each of the two study sites, stations I, II, and III, representing upper, middle and lower reaches respectively.

The physical factors selected were temperature, transparency and specific gravity, while pH, dissolved oxygen and chlorosity were selected as chemical factors.

Stations were visited by means of a boat. Water and air temperatures were taken with a simple thermometer graduated to 0.5°C. Water transparency was measured with a white enamelled Secchi disc 25 cm in diameter. Specific gravity was determined with simple hydrometer graduated to 0.005 unit. Water sampler for dissolved oxygen, and chlorosity were collected with a standard water sampler (Casel a, London). Samples for oxygen were fixed soon after collection. The chemical analysis of the water samples were completed the same day on return from the field trip. The Winkler method

Table 1 : Physical characteristics observed at the three different stations of Sarraji and Mehejran.
Sarrajī canal
Mehejran canal

	Station 1		Station 2		Station 3		Air Water		Station 1		Station 2		Station 3		Air Water	
	Depth	K	Depth	K	Depth	K	Temp.	Temp.	Depth	K	Depth	K	Depth	K	Temp.	Temp.
	cm		cm		cm				cm		cm		cm			
Jan.	128	1.33	232	0.73	full	—	13.3	10.3	104	1.63	99	1.71	180	0.94	13.3	10.0
Feb.	100	1.70	166	1.46	73	2.32	18.0	16.8	116	1.46	140	1.21	126	1.35	19.0	18.3
Mar.	116	1.46	144	1.18	76	2.23	22.8	18.0	118	1.44	135	1.26	129	1.32	23.0	18.5
Apr.	93	1.83	170	1.00	full	—	26.6	22.5	120	1.42	192	0.88	full	—	27.6	24.1
May	160	1.06	200	0.85	180	0.94	36.5	31.0	104	1.63	160	1.06	full	—	37.0	31.2
June	104	1.63	204	0.83	124	1.37	33.5	27.8	120	1.42	170	1.00	full	—	34.3	30.6
July	140	1.21	170	1.00	160	1.06	34.0	32.2	115	1.48	120	1.42	full	—	34.3	30.0
Aug.	120	1.41	240	0.70	full	—	34.0	30.0	180	0.94	198	0.86	full	—	33.0	31.0

was followed for determination of dissolved oxygen. The chlorosity was determined by the ordinary Mohr's method. The hydrogen ion concentration was determined by using ordinary pH paper.

RESULTS AND DISCUSSION

Temperature

Seasonal fluctuations in the temperature conditions of the two study areas are presented in Table 1. It was found that air temperature and water temperature were closely-related variables. The water temperatures coincided with air temperatures. As stated by Lagler (1956), air temperature has an important influence on the temperature of the water. Minimum water temperature was recorded in January at both canals, and the maximum in July at Sarraji. At Mehejran, the higher water temperature of 31.2°C was recorded in May and 31.0°C in August. The lowest and the highest air temperatures were recorded in January and May respectively at both the study areas. Arndt and Al-Saadi (1975), recorded minimum water temperature in January and maximum in August for the Shatt-al-Arab River. No significant difference between the air and water temperatures of the two canals and of the stations was observed.

Transparency of water

Al-Sarraji the transparency of water was quite high and was, therefore, congenial to the growth and survival of phytoplankton. Mehejran's fluctuations, in the Secchi disc transparency at the different stations of each canal are shown in Table 1.

On examining the data three facts are noted : First; in the both canals, the water of station 1 is less transparent than

Physico-chemical features of two side branches of Shatt-al-Arab

those of the other stations, perhaps due to the water flow in the Shatt-Al-Arab causing a continuous disturbance. Second; there is no seasonal differences in transparency, the K values during the different months being not much different. Third; there is a greater transparency of water at the stations of lower portions (station 3). This may be due to the effect of the abundance of the submerged aquatic plants which cover the bottom in these stations. Further the area is shallow and away from the effect of the water flow in the Shatt-Al-Arab.

The extent of photosynthetic zones as calculated after Vatova (1961) on multiplying the Secchi disc readings by 3.3, showed photosynthetic depth values closer to those obtained by Keel and Saad (1975), and are therefore, in good agreement with phytoplankton blooms of this area. On comparing the present data with those of Arndt and Al-Saadi (1975) and Keel and Saad (1975) the transparency of these areas was found much more higher than that of the Shatt-Al-Arab and the adjacent areas.

Specific gravity

The specific gravity of the water in both study areas ranged between 0.990 and 0.960. the most frequent one was 0.985. Little difference was observed among the stations as well as among the seasons.

Water pH

The pH values are given in Table 2. The pH ranged between 7.5 and 8.0. Accordingly the water of the two canals tend to be alkaline as that of the Shatt-Al-Arab, pH of which was found to be 7.27 — 8.33 (Arndt and Al-Saadi, 1975). The huge amount of submerged aquatic plants in this area may account for this.

Dissolved oxygen

Table 2 shows monthly fluctuations in dissolved oxygen values for the two canals. Values varied from a minimum of 2.82 mg/l in August to a maximum of 13.10 mg/l in January. Dissolved oxygen trends in both areas seemed to be generally similar, showing a higher levels of oxygen during the winter months than during the summer. This would be expected from the greater solubility of oxygen in water at low temperatures than at high ones. Exceptions to these general trends were noted in station I of both the study areas were high values were obtained during June in Sarraji, and during July in Mehejran. These are doubtless reflections of the high level of photosynthetic activities of the numerous aquatic plants available in the canals at that time. Generally the dissolved oxygen showed normal concentrations, with the exception of August values at the lower reaches of the canals.

Chlorosity

The chlorosity of Sarraji canal varied from 0.20 g/l minimum to 1.35 g/l maximum. Mehejran showed a variation from 0.21 g/l minimum to 0.90 g/l maximum (Table 2). These data on chlorosity indicate that the study area is not much influenced by the tidal currents and hence of the Arab Gulf salinity.

With the exception of (station III) in Sarraji canal, the chlorosity values never exceeded 0.90 g/l. The higher chlorosity values at this station might have resulted from a high evaporation rate from the shallow waters. Further this portion act as drainage for the irrigation of the nearby agricultural fields. The same conclusion can be drawn for the high value of chlorosity in (station III) of Mehejran canal. Seasonal variation in chlorosity was encountered in this area.

Table 2 : Chemical characteristics observed at the three different stations of Sarraji and Mehejran canals.

	Saraji Canal						Mehejran Canal											
	pH			02 Content			Chlorosity			pH			02 Content			Chlorosity		
	All	S 1	S 2	S 3	S 1	S 2	S 3	All	S 1	S 2	S 3	S 1	S 2	S 3	S 1	S 2	S 3	
Jan.	8.0	10.48	10.48	13.10	0.23	0.38	1.31	7.5	10.66	10.68	12.70	0.42	0.60	0.90				
Feb.	7.5	8.47	8.87	7.26	0.33	0.67	1.35	7.5	7.66	7.66	7.66	0.21	0.23	0.43				
Mar.	7.5	8.87	9.68	8.87	0.48	0.60	1.29	7.5	7.44	7.44	7.67	0.30	0.35	0.42				
Apr.	7.5	8.06	7.66	8.06	0.20	0.33	0.61	8.0	6.85	6.45	7.25	0.33	0.29	0.61				
May	7.5	6.45	6.05	5.64	0.34	0.38	0.55	7.5	6.05	6.05	6.45	0.29	0.33	0.48				
June.	7.5	6.85	6.55	6.05	0.36	0.43	0.82	8.0	6.45	5.64	6.05	0.30	0.32	0.44				
July	8.0	5.24	4.03	4.03	0.37	0.39	0.45	7.5	6.85	6.05	5.24	0.36	0.35	0.39				
Aug.	7.5	6.05	5.24	2.82	0.33	0.33	0.35	7.5	4.86	4.03	3.63	0.58	0.58	0.63				

SUMMARY

Temperature, light penetration, specific gravity, pH, dissolved oxygen and chlorosity were measured at three stations in each of the two main branches, Sarraji and Mehejran of the Shatt-All-Arab river between January and August 1977.

The air temperatures ranged from 13.3°C to 34.3°C and water temperature from 10.3°C in January to 32.2°C in July. Minimum water temperatures were recorded in January at both canals and the maximum in July at Sarraji, and in August at Mehejran.

The transparency of the water was very high due to the abundance of aquatic plants and little influenced by water flow, without seasonal variation. Specific gravity was about 0.980, the water pH was between 7.5 and 8.0. Dissolved oxygen level was normal (13.10—2.82 ppm), showing a higher level during the winter months. The upper and middle reaches of both the canals showed typical freshwater character except the lower reaches.

ACKNOWLEDGMENTS

We are grateful to Dr. Sufian K. Al-Nasiri, head of the Department of Fisheries, college of Agriculture, University of Basrah. Dr. Khalaf Al-Robaae, Director, Natural History Museum, University of Basrah, for encouragement and necessary laboratory facilities, and Dr. Abdul-Latif Sarker, Department of Fisheries of the same University for his revision of the original manuscript.

- Arndt, E. A. and H. A. Al-Saadi (1975). Some hydrographical characteristics of the Shatt-Al-Arab and adjacent areas. Wiss. Zeitschv. Rostock. Math-nat. Reihe S. 789-796.
- Khalaf, A. N. and L. J. MacDonald (1975). Physico-chemical conditions in Temporary ponds in the new forest. Hydrobiol. Vol. 47, 301-318.
- Keel, V. and M. A. H. Saad (1975). Untersuchungen uber das phytoplankton und einige umwelt parameter des Shatt-Al-Arab (IRAQ). Int. Rev. ges. Hydrobiol. 60, 409-421.
- Lagler, K. F. 1956. Freshwater Fishery Biology. WM. C. Brown comp. publisher, Dubuque, Iowa.
- Mohammad, M. B. M. (1965). Preliminary observations on some chemico-physical features of the Shatt-Al-Arab estuary. Proc. Iraqi Sci. Soc. 6 : 34-40.
- (1965). Further observations on some environmental conditions of Shatt-Al-Arab. Bull. Biol. Centre. Babhdad 1 : 71-79.
- Nippon Coel Co., LTD. (1972). Study report on the Shatt-Al-Arab project. Ministry of Agrarium Reform, Baghdad.
- Vatova, A. (1961). Primary production in the high Venice Lagon. J. cons. 26 : 148-155.

الخلاصة

تناول البحث دراسة بعض الخواص الفيزيائية والكيميائية مثل : درجات الحرارة ، توغل الضوء ، الوزن النوعي ، درجة الحموضة ، كمية الاوكسجين المذاب ، درجة الملوحة لمياه فرعين من فروع شط العرب هما مهيجران والسراجي وثلاث محطات في كل فرع . . في الفترة الواقعة بين كانون الثاني - آب ١٩٧٧ .